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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/809,748	03/15/2001	Chris Heegard	ALA-111	5348
23494	7590	07/12/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			WANG, TED M	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2634	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. **09/809,748**Applicant(s) **HEEGARD ET AL.**Examiner **Ted M. Wang**Art Unit **2634**

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-12 and 14-16 is/are allowed.
- 6) ☒ Claim(s) 1 and 4-6 is/are rejected.
- 7) ☒ Claim(s) 2 and 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, filed on 04/04/2005, have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicants' arguments but firmly believes that the cited reference to reasonably and properly meet the claimed limitations.

Independent Claims 1, 4, 5, and 6

(1) *Applicants' argument* – “Applicants respectfully disagree and point to the Examiner that first, in the cited sections Avidor et al. do not describe removing angle rotation instead it describes” and “Second, claim 1 recites that the rotation is determined based on a reference symbol. Avidor et al. do not even describe using any reference symbol for any kind of processing.” as recited.

Examiner's response – In response to applicant's first argument as described in the above paragraph, the cited patent Avidor et al. discloses a nonlinear processor 30 applies a nonlinear algorithm to the samples to remove the modulation from the samples (column 4 lines 33-36). In column 6 lines 44 –61, it continues teaching that after the estimator E generates the discrete-time samples, a nonlinear demodulator 30 removes the data dependency of the samples (block 214) and defines $\Phi(n) = (\Delta\omega - i * (\Omega)/(2k + 1))nT + \theta + \theta_n$, where θ_n is the phase shift due to the information that modulated the carrier. To retrieve the reference phase of the carrier, the effects of θ_n are eliminated or removed. In column 6 line 62 – column 7 line 25, Avidor et al. described how the θ_n to be eliminated or removed.

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In response to applicant's second argument as recited in the above paragraph, the cited patent Avidor et al. further discloses symbol sampler 28, filter and sample each symbol within the rotated signal (column 4 lines 32-33). Each sampled symbol can be considered as a reference symbol, since in claims 1, 4, 5, and 6 of the instant application do not specifically define the "reference symbol".

Thus, for the explanation addressed in the above paragraph, the rejection under 35 U.S.C. 102(e) with Avidors' reference is adequate.

2. Applicant's arguments, filed on 04/04/2005, with respect to claims 2, 3, 7-11, and 14-16 have been fully considered and are persuasive. The rejections of 35 USC § 102(e) and 35 USC § 103(a) have been withdrawn.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Avidor et al. (US 6,421,399).

- With regard claim 1, Avidor et al. discloses a method for estimating carrier

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frequency and phase offsets comprising: (a) estimating one or more phases of a sequence of digitally modulated symbols (Figs.1 and 4 element $r(t)$, column 4 lines 18-26 and column 4 line 54 – column 5 line 24);

(b) removing from each of the estimated phases an angle rotation introduced by a modulation format, wherein the rotation is determined based on a reference symbol (Fig.1 element 30 and Fig.2 element 214, column 3 lines 18-25, column 4 lines 25-37, and column 6 line 44 – column 7 line 25);

(c) deriving a set of values from the estimated phases after removal of said angle rotation (Fig.1 element 36, Fig.2 element 226, Fig.4 element 68, Fig.5 element 274, column 3 lines 26-32 and column 7 line 40 – 57, and column 8 line 10 – column 9 line 25), wherein said values are a function of the carrier frequency and phase offsets to be estimated (column 3 lines 26-32 and column 7 line 58 – column 9 line 25); and

(d) processing said values to determine estimates of the carrier frequency and phase offsets (Fig.1 elements 36 and 40, Fig.2 elements 222 and 224, Fig.4 element 66 and 70, Fig.5 elements 272 and 276, and column 7 line 58 – column 9 line 25).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

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Patentability shall not be negated by the manner in which the invention was made.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avidor et al. (US 6,421,399) in view of Dobrica (US 5,875,215).

- In regard claim 4, Avidor et al. discloses all of the subject matter as described in the above paragraph except specifically teaching that the processing of step (d) uses an estimation algorithm based on the recursive least-squares method. However, Dobrica teaches that uses an estimation algorithm based on the recursive least-squares method (Fig.2 element 7 and Fig.3 and 4, column 1 line 40 – column 2 line 3, column 5 line 51 – column 6 line 10, and column 7 line 63 – column 10 line 1).

It is desirable to use an estimation algorithm based on the recursive least-squares method in order to reduce the multiplicative distortion, improve the reliability of the estimation, and compensate for an influence of a tracking delay in RLS estimation (column 1 lines 39-50). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by Dobrica in which use an estimation algorithm based on the recursive least-squares method, into Avidor's estimation algorithm so as to reduce the multiplicative distortion, improve the reliability of the estimation, and compensate for an influence of a tracking delay in RLS estimation.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avidor et al. (US 6,421,399) in view of Li et al. (US 6,031,880).

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- In regard claim 5, Avidor et al. discloses all of the subject matter as described in the above paragraph except specifically teaching that the processing of step (d) uses an estimation algorithm based on the Kalman filter method.

However, Li et al. teaches that uses an estimation algorithm based on the Kalman filter method (Fig.4 element 70, column 1 line 39 – column 2 line 8, and column 5 line 42 – column 7 line 41, and column 9 line 20 – column 10 line 34). It is desirable to use an estimation algorithm based on the Kalman filter method in order to reduce the computation of gain for each symbol (column 9 lines 7-20). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by Li et al. in which use an estimation algorithm based on the Kalman filter method, into Avidor's estimation algorithm so as to reduce the computation of gain for each symbol.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Avidor et al. (US 6,421,399) in view of Denno et al. (US 5,287,067).

- In regard claim 6, Avidor et al. discloses all of the subject matter as described in the above paragraph except specifically teaching that the processing of step (d) uses an estimation algorithm based on the least-mean squares method.

However, Denno et al. teaches that uses an estimation algorithm based on the least-mean squares method (Fig.13 and column 10 line 65 – column 11 line 50). It is desirable to use an estimation algorithm based on the least-mean squares method in order to improve the quality at high speed and reduce the complicated

circuit configuration (column 3 lines 5-12). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by Denno et al. in which use an estimation algorithm based on the least-mean squares method, into Avidor's estimation algorithm so as to improve the quality at high speed and reduce the complicated circuit configuration.

Allowable Subject Matter

9. Claims 7-12 and 14-16 are allowed.
10. Claims 2 and 3 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. The following is an examiner's statement of reasons for allowance.
 - The prior art fails to teach an apparatus of Claims 7-12 and 14-16 that specifically comprises the following:
 - The instant application is deemed to be directed to a non-obvious improvement over the admitted prior art of the instant application and the invention patented in Pat. No. 6,421,399, and 5,233,632. The improvement comprises that (b) determining an angular location of first symbol; (c) determining an angular location of a second symbol; (d) removing the modulation from the second symbol to produce an unmodulated angular sequence; as recited for claims 7-12, and an unwrap

module for converting the phase estimates generated by the phase calculator module into absolute value for claims 14-16.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

13. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M Wang
Examiner
Art Unit 2634

Ted M. Wang



SHUWANG LIU
PRIMARY EXAMINER